REMARKS/ARGUMENTS

A substitute specification is being filed in order to conform with U.S. practice. Headings have been added to the specification. Spelling and grammatical errors have also been corrected. The substitute specification contains no new matter. Amendments have been made to the claims to remove the multiple dependencies and an abstract has been added. An early action on the merits is respectfully requested.

If any additional fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on November 30, 2004.

Rachel Piscitelli

SUBSTITUTE SPECIFICATION WITH MARKINGS

Medical tools for dental treatments by means of a laser

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a medical tool for dental treatments by means of a laser, whose light guide runs in a handpiece, said light guide being assigned a laser module with power circuitry.

[0002] In the field of dentistry, there are presently five different laser types with a total of seven different wavelengths. For example, a dental laser with a handpiece is disclosed in WO 93/19684. With such a laser, however, only a single method of treatment is possible. The same applies also to a medical tool corresponding to EP 0 523 506 A1, in which channels for a coolant are also provided in the handpiece.

[0003] DE 198 44 719 A1 discloses a laser treatment device, in particular for performing medical or surgical treatment by means of laser radiation. This device comprises a solid-state laser for generating a laser beam, an excitation light source which excites the solid-state laser, a first optical system with a Q-switch which transmits light waves generated by the solid-state laser as a pulsed laser beam, a second optical system with which light waves generated by the solid-state laser are transmitted as a continuous wave laser, and a system for switching the optical path, with which system an optical path for the light

oscillations generated by the solid-state laser is switched from one of the optical paths of the first optical system or of the second optical system.

[0004] In US 6,270,342 B1, a handpiece specially designed for dental treatments is proposed. The handpiece contains a functional device which, for example, can be a diode laser, a diode-pumped solid-state laser, an LED, a microwave generator or ultrasound generator. In an illustrative embodiment 6, it is then stated that light from the laser device can be divided into two light systems. The first laser system is used for the surgical intervention, and the second laser system disinfects the tissue in order to reduce side effects or blood loss.

[0005] The object of the present invention is to develop a medical device of the above-mentioned type which allows the dentist to use one and the same device to carry out different treatments in dentistry.

SUMMARY OF THE INVENTION

[0006] ~~This~~ The foregoing object is achieved by the ~~fact that~~ present invention wherein the first laser module is assigned a second laser module with a different wavelength.

[0007] Especially when a short-wavelength laser is chosen for the first laser module and a long-wavelength laser is chosen for the second laser module, about 90 to 95% of all desired

treatments can be performed with one and the same tool. This affords clear advantages for the dentist, encouraging him to invest in a tool of this kind.

[0008] In a preferred illustrative embodiment, the first module should be one for a diode laser, a wavelength of 750 to 1100 nm being preferred. More restrictively, the wavelength preferably lies at 810 ± 10 nm or 980 ± 10 nm. The power is typically from 1 to 20 W.

[0009] The second, long-wavelength laser is preferably an erbium:YAG laser in a wavelength range of 2500 to 3500 nm. Here, a wavelength of 2940 ± 100 nm is preferred.

[0010] It is conceivable to assign the same light guide to both laser modules. However, the illustrative embodiment is preferred in which each laser module has its own light guide, it being possible to provide both light guides together in one handpiece or else separately in separate handpieces. For the diode laser, glass fiber is preferred as the light guide, and a hollow waveguide is preferred for the erbium:YAG laser.

[0011] The diode laser should preferably also be assigned an optical element composed of two lenses. Moreover, a line for a coolant is also provided in the handpiece.

[0012] As has been mentioned above, the different lines can be provided in a single handpiece, but it is also conceivable for the dentist to have several handpieces available with different

combinations of light guide and/or coolant line. The latter has the advantage that the dentist cannot inadvertently start up incorrect operations since he always has to select the desired handpiece and he does not inadvertently trigger undesired functions via the wrong switch.

[0013] The handpiece should preferably be connected in a releasable manner to a rear part which in turn communicates with a base unit via a common line. The laser modules, the associated power circuitry and control modules are housed together in this base unit. The base unit can also have a display and/or touch screen with which the dentist can select defined functions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further advantages, features and details of the invention will become clear from the following description of preferred illustrative embodiments and from the drawing, in which

[0015] Figure 1 shows a plan view, in block diagram form, of part of the medical tool according to the invention for dental treatments by means of a laser;

[0016] Figures 2 (a) to (d) show schematic plan views of other parts of the medical tool for dental treatments by means of a laser.

DETAILED DESCRIPTION

[0017] According to Figure 1, a laser module 2 of a diode laser and a laser module 3 of an erbium:YAG laser are accommodated in a base unit 1. A source 4 for coolant, and control circuitry 5, are also provided.

[0018] The base unit 1 is in communication with a rear part 7 via a common line 6. The diode laser module 2 is connected via a connection line 8 to an optical element 9 in which two lenses 10.1 and 10.2 are fitted.

[0019] The erbium:YAG laser 3 is connected via a connection line 11 to a hollow waveguide 12 which preferably has a stainless steel tube in which the laser light is reflected.

[0020] A connection line 13 from the source 4 for coolant opens into a transfer piece 14. A connection line 15 from the control circuitry 5 is in communication with switch elements 16 for function selection.

[0021] According to Figure 2, different handpieces can be fitted into the rear part 7. The handpiece 17.1 of Figure 2(a) is suitable for general operation of a diode laser and therefore has only a light guide 18. This diode laser should have a high power, typically of from 3 to 20 W.

[0022] A light guide 19 for the erbium:YAG laser and a coolant line 20 are integrated in a handpiece 17.2 according to Figure 2 (b).

[0023] By contrast, in a handpiece 17.3 according to Figure 2 (c), the light guide 18 for the diode laser is combined with the coolant line 20.

[0024] In the handpiece 17.4 according to Figure 2 (d), the laser concerned is a soft laser with low power, ca. 100 mW, in which a light guide 18.1 is assigned a large surface area glass rod 21 which can have a diameter of 5 to 8 mm. This can be used in particular for gentle treatment of larger dental areas.

[0025] The mode of functioning of the present invention is as follows:

[0026] The base unit 1 with the corresponding laser modules 2 and 3, the source 4 for coolant and the control circuitry 5, stands next to a treatment chair. The dentist providing the treatment has the rear part 7 connected via the common line 6 to the base unit 1. To treat a patient, he can now select a suitable handpiece 17.1 to 17.4 from a set available to him, depending on what kind of treatment he wishes to perform on the patient. He can set up the appropriate light guides 18, 18.1, 19 and coolant lines 20 via the switch elements 16 on the rear part 7. Of course, this can also be done via a suitable foot switch.